Monitoring and Adaptive Management of Aquatic Ecosystem Restoration Projects

Steven B. Pugh
Baltimore District
U.S. Army Corps of Engineers

OJECTIVES

- **Provide Introductory Information on M&AM**
- **Provide Update on use of M&AM with USACE**
- **Success Stories of Creative Uses of M&AM**

Introductory Information

- **Define Monitoring**
- **Define Adaptive Management**
- **Policy Guidance on M&AM**

Monitoring Definition

- **Monitoring is the systematic, scientific OBSERVATION of processes including the results of an action, and clear DOCUMENTATION of the data in a manner conducive to further EVALUATION and DECISION-MAKING**

- **FIGURE OUT WHAT'S GOING ON**

Adaptive Management Definition

- **Adaptive Management is an iterative process by which restoration measures or management actions are systematically evaluated and subsequently modified in response to new information**

- **MAKING A CHANGE TO IMPROVE ENVIRONMENTAL OUTPUTS AND/OR COST EFFECTIVENESS**

Monitoring Guidance

- **ER1105-2-100, (Planning Guidance Notebook), Chapter 3 (page 3-25) 3-5.b.(8)**
  - Monitoring may be necessary to determine if predicted outputs are being achieved
  - Cost shared monitoring shall not exceed 5 years after completion of construction
  - Cost shared, post implementation monitoring shall not exceed 1% of total first cost of project

Adaptive Management Guidance

- **ER1105-2-100, (Planning Guidance Notebook), Chapter 3 (page 3-25) 3-5.b.(8)**
  - **Complex Specifically Authorized Projects**
  - **High Levels of Risk and Uncertainty**
  - **3% of Total Project Cost**

Other M&AM Guidance

- ER 1105-2-100, Appendix E (page E-149)
- ER 1105-2-100, Appendix F (Continuing Authorities), (page F-19.f.)
- EP-1165-2-502, page 18.b. “Partnerships”

Update on M&AM with the USACE

- **PA Class of 2003 Report Background**
- **Important Findings of M&AM Report**
- **Creative Ways M&AM is Being Done**

Planning Associates 2003 M&AM Report

- **Interviewed Experts from each MSC**
- **Did not include Large Programs**
- **Some Question Topics were related to:**
  - **1. Have You Ever Used M&AM?**
  - **2. How Did You Fund M&AM?**
  - **3. What Did You Learn From Monitoring?**
  - **4. What Type of Adaptive Management?**

Mixed Responses

- **NEGATIVE**
- **POSITIVE**

NEGATIVE RESPONSES

- **My District Has Never Used M&AM**
- **The Corps Doesn’t Do M&AM**
- **There Is No Money to Do M&AM**
- **The Corps Doesn’t Do Research**

POSITIVE RESPONSES

- I Go **Fishing** at our Project Sites
- **None Federal** Partners Have Used M&AM
- We Have Used **Partnerships** to Accomplish M&AM
- We Have Received **Funding Cap Exemptions** for M&AM

Some Important Results

- Funding Limits Make M&AM Challenging (except on **LARGE** Programs/Projects)
- **Partnerships** Have Been Successful
- **Exemptions** to Funding Limits Have Been Approved
- M&AM Efforts Have Produced Many **Benefits**

Success Stories

- **THREE RESTORATION PROJECTS**

- **ACROSS FOUR GRADIENTS**
  - **TYPE OF SIGNIFICANT RESOURCE**
  - **LANDSCAPE POSITION**
  - **PROJECT PHASE & FUNDING**
  - **SIZE OF PROJECT/PROGRAM**

For Each Success Story

- **Project Background**
- **How Monitoring and/or Adaptive Management was Funded**
- **What Products & Benefits were Produced**

BLACKWATER MARSH RESTORATION

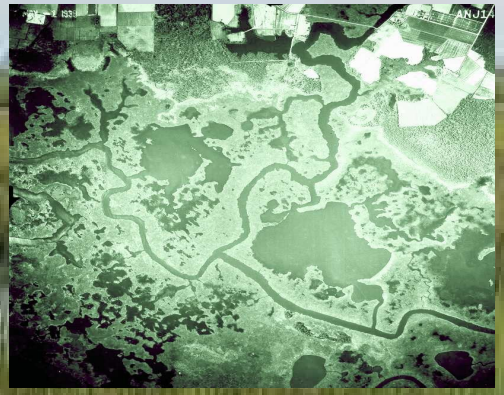
CAP Section 206

Wetland Restoration

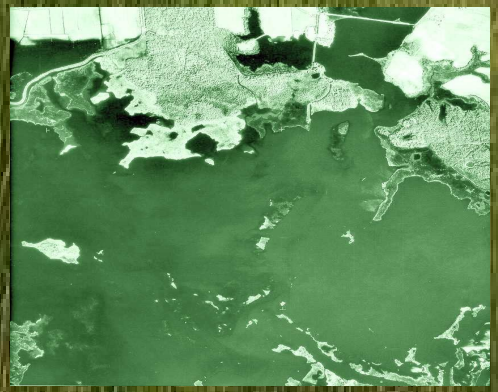
Feasibility Demonstration Project

Cost of Construction ($100,000's)

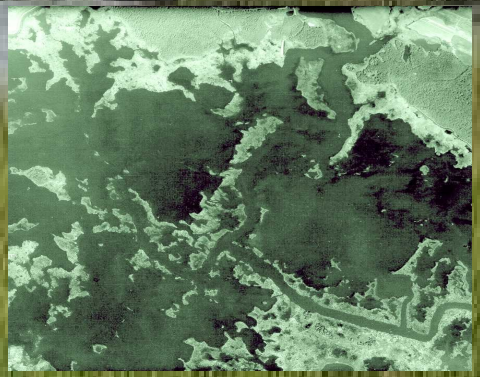
The Disappearing Marsh



1938--with discreet ponds and channels within the marsh
system



1989--discreet features have
disappeared and severe



1974--breached ponds, integrity of the channels have been compromised and significant marsh loss is evident.

Blackwater totals:
Total Loss: Approximately 8000 acres
Loss Per Year: Approximately 130 acres

RESTORATION MEASURES
FILLING
HAY BALES

Restoration Measures

Thin Layer Spraying

Pumping and Dumping

Restoration Measures

Post-Planting: Aug 2003

Blackwater: Monitoring Purpose

- **Evaluate Effectiveness of Different Construction Techniques**
  - **thin layer spraying**
  - **pump and dump**
- **Evaluate Effectiveness of Plantings under Different Conditions**
  - **time of year**
  - **sediment types**
- **Evaluate Effectiveness of Different Vegetation Establishment Techniques**
  - **hydro-seeding**
  - **planting with volunteers (people not plants)**
  - **no-planting**

Blackwater: Monitoring Purposes

- **Evaluate the Level of Success of Establishing a Native Marsh Plant Community**

- **Focus:**
  - **High Quality Environmental Outputs**
  - **Most Cost Effective Methods**

Blackwater: Funding & Implementation

- **PARTNERSHIPS**
  - **USACE**
  - **MARYLAND DNR**
  - **USFWS**
  - **NATIONAL AQUARIUM OF BALTIMORE**
  - **NOAA**

Blackwater: Funding & Implementation

- **FUNDING**
  - **USACE (Cost Share)**
  - **MARYLAND DNR (Cost Share)**
  - **NATIONAL AQUARIUM OF BALTIMORE (Applied for Grant)**
  - **NOAA (Awarded Grant)**

Blackwater: Monitoring Products

- **Monitoring Reduced Overall Project Costs to the USACE & MD DNR**
- **National Aquarium of Baltimore Grant**
  - **Paid for the plants & use of volunteers to plant 3 of the 15 acres**
  - **The Corps cost for monitoring was approximately 16 K**
  - **Average Cost to Plant an Acre 15K**
  - **Partnering with Nat. Aquarium of Baltimore Effectively REDUCED Project Cost by 29K or 7%**

Blackwater: Monitoring Products

- Lessons learned for implementing Large-Scale Project (cost effective, quality)
- Great Publicity
  - Volunteers at National Estuary Conference
  - On Display at National Aquarium of Baltimore
  - News Articles
  - Kiosk at Blackwater Wildlife Refuge
- Public Ownership
  - Friends of Blackwater
  - Volunteers Used For Planting

Blackwater Adaptive Management

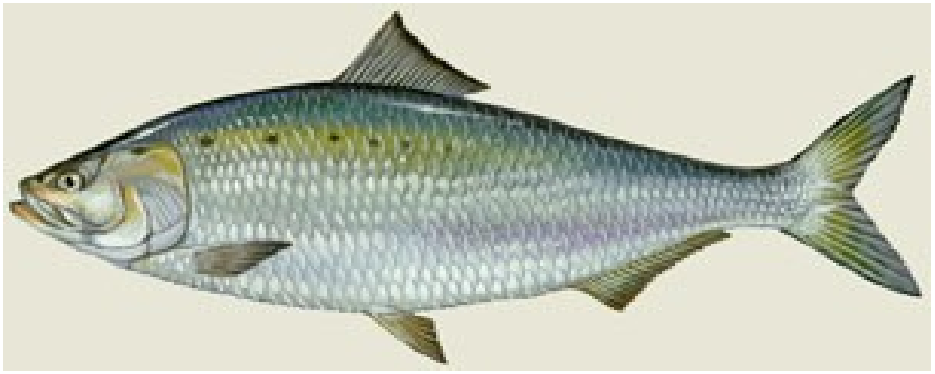
- **Existing Demo Project: None Needed Yet**
- **Large Scale Restoration**
  - **adapt construction techniques**
  - **potential changes in vegetation plantings**

LITTLE FALLS FISH PASSAGE

- CAP Section 1135
- Fish Passage
- Post Construction Monitoring
- Cost of Construction (Several Million)

Blocking 10 Miles of Migratory Fish Habitat

MIGRATORY FISH



American shad

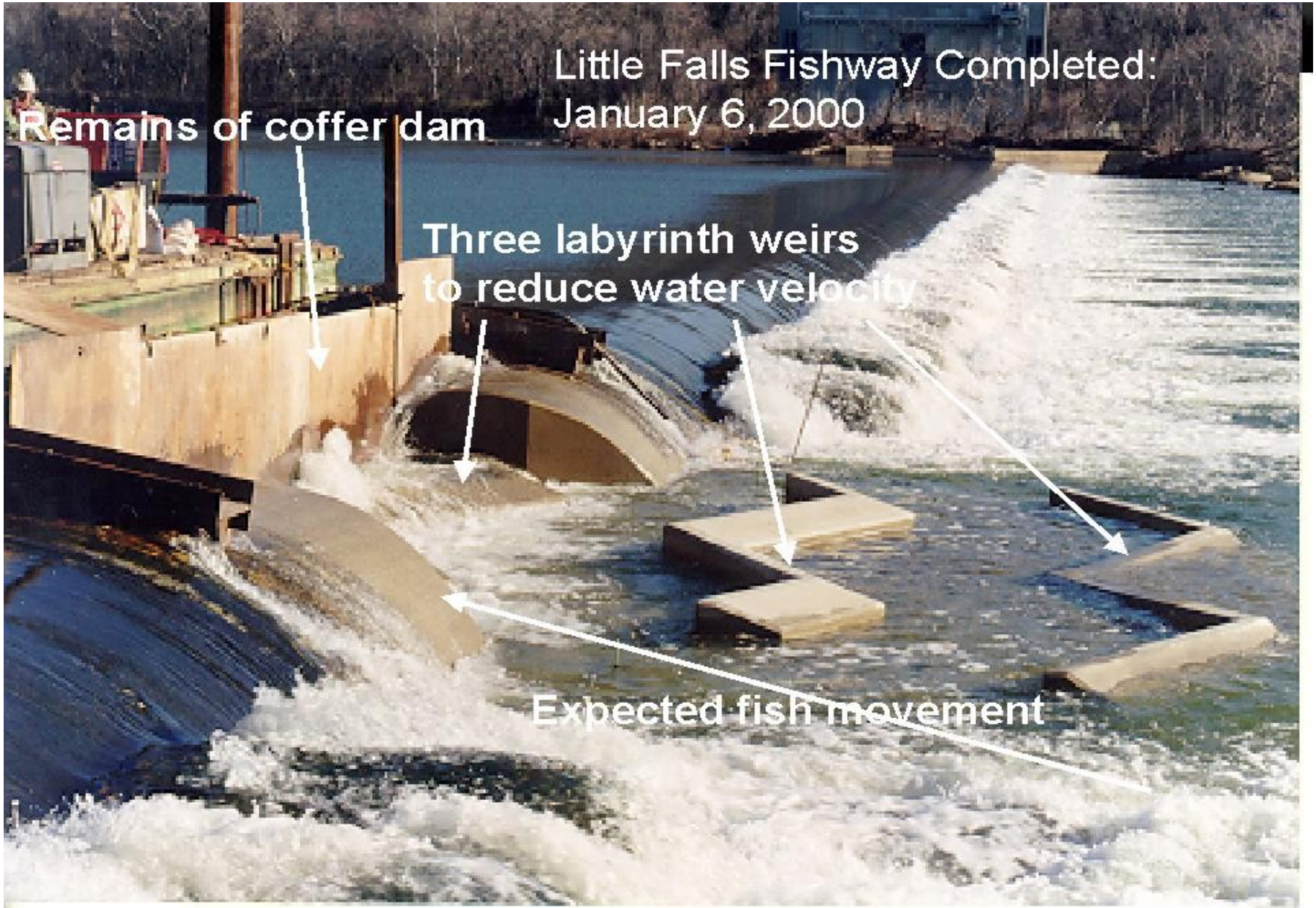
Restoration Measure

Cut a Gap in the Dam

Restoration Measure

Constructed a Fish Passage

Nearly Completed Project



Little Falls
Fish Passage

1999-Little Falls Dam

2000-Little Falls Dam, During
and After Construction

Little Falls: Monitoring Purpose

- Evaluate the Effectiveness of the Fish Passage
- Are American shad Making it Upstream of Little Falls Dam?

Little Falls Funding & Implementation

- **Partnerships:**
  - **USACE**
  - **MD Department of Natural Resources**
  - **ICPRB**
  - **USFWS**

Little Falls Funding & Implementation

- **FUNDING**
  - **USACE (Cost Share)**
  - **MARYLAND DNR (Cost Share)**
  - **Inter State Commission on the Potomac River Basin (GRANT)**
  - **USFWS**

Little Falls: Monitoring Products

- **ICPRB Conducted Monitoring - Adding on to an Existing Stocking Effort**

- **Annual Report: YAHOO!! IT WORKS!!**

Little Falls: Monitoring Products

- **Additional Products**
  - **Enhanced Existing Stocking Program**
    - **15.6 million fry stocked in 8 years**
    - **4 of the years during our cost shared monitoring**
  - **Great Publicity**
  - **Established Great Partnerships for Future Projects in the Basin**

Little Falls Adaptive Management

No Adaptive Management Needed

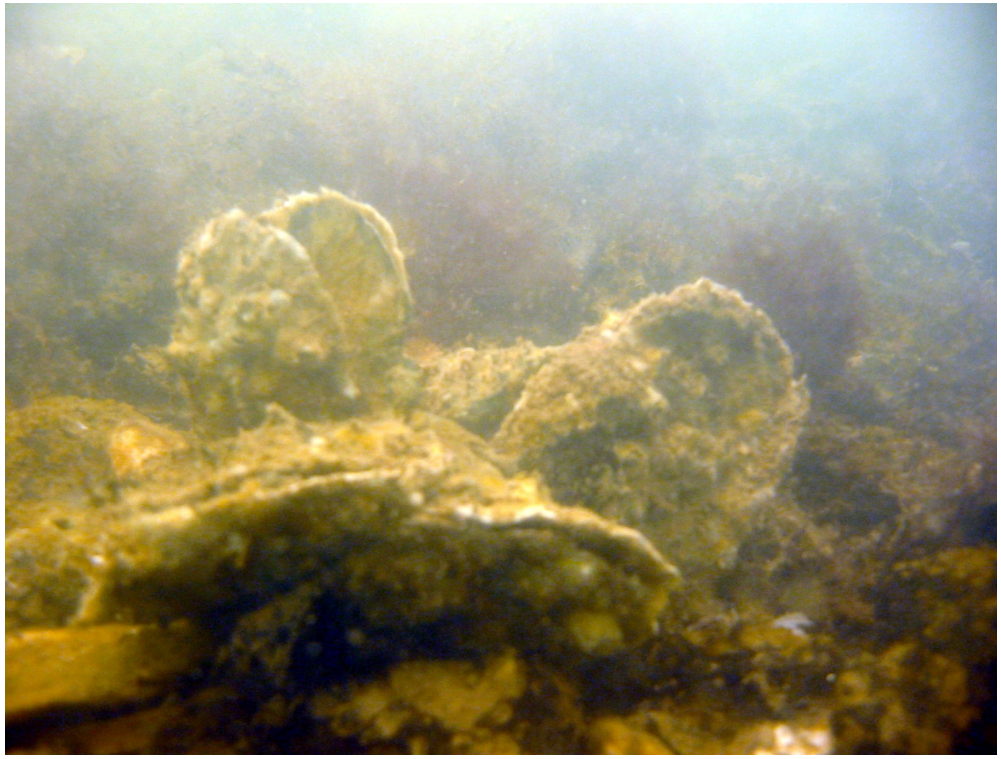
American shad make it to here

CHESAPEAKE BAY OYSTER RECOVERY PROGRAM

- Section 704(b) WRDA 1986
- Native Oyster Restoration
- On-going Program
- Costs: Millions - 10’s of Millions

Loss of Oysters in Chesapeake Bay

- Historically, Oysters could filter the waters of the entire Bay



- Currently, it takes at least 1 year (if at all)

Restoration Measures

Placing Shell

Restoration Measure

Placing Spat

Oyster Program: Monitoring Purposes

- **Evaluate Survival, Growth & Impacts from Disease Under Different Conditions**
  - **Site Selection**
  - **Size & Shape of Oyster bed/bars**
- **Evaluate Restoration Methods to Maximize**
  - **Cost Effectiveness**
  - **Environmental Outputs**

Oyster Program: Monitoring Funding & Implementation

- **Partnerships**
  - **USACE**
  - **MD Department of Natural Resources**
  - **Oyster Recovery Partnership**
  - **University of Maryland**
  - **Others**

Oyster Program: Monitoring Funding & Implementation

- **Funding**
  - **USACE**
  - **MD DNR**
  - **Oyster Recovery Partnership**
  - **University of Maryland**

Oyster Program: Monitoring Products

- **SAVING MONEYON SHELL**
  - BEDS: 3 inch height as good as 6 inch height
  - Potentially **REDUCE COST 10K PER ACRE**
- **Reduction In Amount of Shell Needed**
  - **Decrease Environmental Impacts of Dredging for Shell**
  - **Less Demand on Scarce Resource (MD)**

Oyster Program: Monitoring Products

- **SAVING MONEY ON SPAT- MAYBE**

- **<u>PRELIMINARY</u> FINDINGS**
  - **PLACING 1 MILLION SPAT/ACRE MAY BE AS EFFECTIVE AS 2 MILLION**
  - **POTENTIAL SAVINGS: 10K - 15K/ACRE**

Oyster Program: Adaptive Management

- **Changes in shape (bars/beds) of shell placement**
- **Changes in depths of shell placement on beds**
- **Changes in site selection**
- **Changes in density of spat placement**

SUMMARY

- **Provide Introductory Information on M&AM**
- **Provide Update on use of M&AM with USACE**
- **Success Stories of Creative Uses of M&AM**

QUESTIONS ???